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EXAMINER
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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* FRANCIS C. WESSLING, JR. and JAMES M. BLACKWOOD

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Appeal 2009-003426  
Application 10/808,677  
Technology Center 3700

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Before LINDA E. HORNER, JOHN C. KERINS, and STEVEN D.A.  
McCARTHY, *Administrative Patent Judges*.

KERINS, *Administrative Patent Judge*.

DECISION ON APPEAL<sup>1</sup>

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<sup>1</sup> The two-month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. § 1.304, or for filing a request for rehearing, as recited in 37 C.F.R. § 41.52, begins to run from the “MAIL DATE” (paper delivery mode) or the “NOTIFICATION DATE” (electronic delivery mode) shown on the PTOL-90A cover letter attached to this decision.

### STATEMENT OF THE CASE

Francis C. Wessling, Jr. and James M. Blackwood (Appellants) seek our review under 35 U.S.C. § 134 of the Examiner's final rejection of claims 1-8, 10-13 and 21-27. Claims 9, 14 and 18-20 were canceled previously. The Examiner has indicated that claims 15-17 are allowable. We have jurisdiction under 35 U.S.C. § 6(b) (2002). We REVERSE.

### THE INVENTION

Appellants' invention is directed to a phase change material as well as to methods for employing a phase change material, particularly for use in maintaining a desired temperature for a biological material. Claim 1, reproduced below, is illustrative of Appellants' invention:

1. A phase change material comprising:

a mixture of water and deuterium oxide wherein the mole fraction of deuterium oxide is selected to provide a desired phase change temperature in a range above zero degrees Celsius and below 3.8 degrees Celsius, wherein the mixture is positioned in close proximity to a biological material such that a temperature of the biological material is maintained near the desired phase change temperature.

### THE REJECTIONS

The Examiner has rejected:

(i) claims 1-3, 10-12 and 22-27 under 35 U.S.C. § 102(b) as being anticipated by Johnson (US 4,191,125, issued March 4, 1980);

(ii) claims 4 and 13 under 35 U.S.C. § 103(a) as being unpatentable over Johnson in view of Douglas-Hamilton (US 4,530,816, issued July 23, 1985);

(iii) claims 5-8 under 35 U.S.C. § 103(a) as being unpatentable over Hjertstrand (US 4,145,895, issued March 27, 1979) in view of Johnson;

(iv) claim 21 under 35 U.S.C. § 103(a) as being unpatentable over Johnson; and

(v) claim 21 under 35 U.S.C. § 103(a) as being unpatentable over Hjertstrand in view of Johnson.<sup>2</sup>

### ISSUES

Has the Examiner erroneously interpreted and applied the teachings of the Johnson patent in rejecting certain claims as being anticipated by Johnson and other claims as being obvious in view of Johnson alone or in combination with other references?

### ANALYSIS

#### *Claims 1-3, 10-12 and 22-27--Anticipation--Johnson*

Appellants present the same arguments for patentability for both independent claim 1 and independent claim 10. Appellants do not separately argue for the patentability of any of dependent claims 2, 3, 11, 12, and 22-27.<sup>3</sup>

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<sup>2</sup> The rejections of claim 21 on obviousness grounds were identified as new grounds of rejection in the Examiner's Answer. (Ans. 7). Appellants filed a Reply Brief addressing these new grounds, and expressly requested that the appeal be maintained with the new grounds included. (Reply Br. 4).

<sup>3</sup> Appellants purport to group dependent claim 5 with these dependent claims (Appeal Br. 5), however claim 5 is subject to a different ground of rejection, as being obvious over Hjertstrand and Johnson. (See Ans. 6).

At issue in connection with this anticipation rejection is whether the Johnson patent discloses a phase change material that has a phase change temperature in the range of above zero degrees and below 3.8 degrees Celsius. The Examiner's findings that such a material is disclosed by Johnson rely on passages at column 2, lines 57-68, and at column 4, lines 33-42. (Ans. 4, 13). Appellants contend that those passages do not support the Examiner's finding of anticipation. (Appeal Br. 5-6).

The Johnson patent is directed to a freeze indicating device in the form of a liquid-containing capsule, in which the liquid, upon reaching its freezing temperature is intended to change phase from liquid to solid, and in the general case where the liquid is water, will expand upon freezing to rupture the capsule to indicate that the capsule has been exposed to a temperature sufficiently low to freeze the water. (Johnson, col. 1, ll. 5-20). Johnson discusses that the use of water alone in the capsule had previously shown to not accurately indicate that the capsule had been exposed to the normal freezing point of water, i.e., zero degrees Celsius, due to an undercooling effect that would result in the encapsulated water not freezing until a temperature as low as -16° C. was reached. (*Id.* at col. 1, ll. 21-26).

The Johnson patent discloses that the freeze indicator device and the freezing point of the liquid therein can be fine-tuned so that the problems associated with the undercooling effect can be overcome, and so that the device will operate properly (fracture) at a temperature closer to the desired predetermined temperature. (*Id.* at col. 1, ll. 42-44; col. 2, ll. 1-4; col. 2, ll. 57-68). Johnson accomplishes this by adding nucleating agents to the liquid, and by employing a mixture of deuterium oxide and water as the encapsulated liquid. (*Id.*).

Johnson further discloses that the use of nucleating agents alone (presumably with the liquid being only water) will still result in the device freezing at about  $-4^{\circ}\text{C}$ ., which is indicative that the undercooling effect is lessened but not eliminated. (*Id.* at col. 2, ll. 63-65). Johnson thus additionally proposes that deuterium oxide ( $\text{D}_2\text{O}$ ), which has a normal freeze point around  $4^{\circ}\text{C}$ ., be added to water to raise the freeze point of the mixture. (*Id.* at col. 2, ll. 60-63). Johnson specifically discloses that a mixture of 98%  $\text{D}_2\text{O}$  and 2%  $\text{H}_2\text{O}$  will raise the freeze point to approximately  $0^{\circ}\text{C}$ ., and that “[v]arious freeze points between  $-4^{\circ}\text{C}$ . and  $0^{\circ}\text{C}$ . may be provided by adding lesser and lesser amount of  $\text{D}_2\text{O}$  below 98%.” (Johnson, col. 2, l. 65-col. 3, l. 2).

The Examiner maintains that these disclosures in Johnson explicitly teach “a phase change material having a selectable phase change temperature in a range between approximately zero degrees Celsius and 3.8 degrees Celsius.” (Ans. 4). However, claims 1 and 10 call for the phase change material to have a phase change temperature *above* zero degrees Celsius, and, in a best case scenario for the Examiner, these teachings of Johnson disclose providing a phase change material having a phase change temperature of *up to* zero degrees Celsius.

The Examiner appears to recognize the tenuousness of relying on these portions of the Johnson patent as support for the anticipation rejection, in that the Examiner augments the grounds for rejection in the Answer with a citation to column 4, lines 40-42, which is part of a discussion of a working example (Example II) presented in the Johnson disclosure. There, Johnson reports that, of thirty sample frangible containers provisioned with a liquid made up of 98% deuterium oxide and 2% water, as well as a

nucleating agent and a surfactant, 98% of the containers provided an indication of freeze when held at  $-1^{\circ}\text{C}$ . for one hour, and that 75% of the containers froze between  $0.5^{\circ}\text{C}$ . and  $-0.5^{\circ}\text{C}$ . (Johnson, col. 4, ll. 31-42). The Examiner finds that this amounts to a disclosure of a phase change material having a phase change temperature that “is equivalent to a phase change temperature close to a desired temperature above zero degree Celsius . . .”. (Ans. 4).

We do not agree with the Examiner’s finding that the disclosure of a subset (75%) of the tested samples having a phase change temperature between  $0.5^{\circ}\text{C}$ . and  $-0.5^{\circ}\text{C}$ . is equivalent to the claimed range. As pointed out by Appellants, in their use of the phase change material as a temperature regulator for biological materials, temperatures at and below zero degrees Celsius can damage the biological materials. (*See, e.g.*, Spec. 4-5).

Even assuming that the disclosure in Johnson Example II is regarded as a disclosure of a range of phase change temperatures which overlaps Appellants’ claimed range, we do not find adequate evidence to support a finding of anticipation. We are guided by the principle that the claimed subject matter must be disclosed in the reference with sufficient specificity in order to constitute an anticipation. *Atofina v. Great Lakes Chem. Corp.*, 441 F.3d 991, 999 (Fed. Cir. 2006). In the *Atofina* case, neither a disclosure of a broad range of  $100\text{--}500^{\circ}\text{C}$ ., nor a disclosure of a narrower preferred range of  $150\text{--}350^{\circ}\text{C}$ ., was found to anticipate a claimed range of  $330\text{--}450^{\circ}\text{C}$ ., despite the former range fully encompassing the claimed range and the latter range having a degree of overlap with the claimed range. *Id.* The Federal Circuit noted, in this respect, that the disclosure of a range is no

more a disclosure of the end points of the range than it is of each of the intermediate points. *Id.*

In the present case, the cited discussion of test results in Johnson do not identify any particular test specimens among the thirty tested that exhibited specific phase change temperatures within the claimed range, i.e., above zero degrees Celsius and below 3.8 degrees Celsius. More significantly, the ostensible “range” of phase change temperatures of 0.5 to -0.5° C. finds itself at odds with the more salient disclosure in Johnson that the range of freezing temperatures that may be obtained is “between -4° C. and 0° C.” (Johnson, col. 2, l. 68). The Johnson patent thus does not contain sufficiently specific disclosure of subject matter falling within the scope of claims 1 and 10. We are mindful, in making this finding, that the mixture proposed by Johnson (98% D<sub>2</sub>O, 2% H<sub>2</sub>O), when viewed in light of Appellants’ disclosure, possibly would have a phase change temperature within the claimed range. However, we are constrained to determine what Johnson discloses to persons of ordinary skill in the art, without taking into account material found in Appellants’ disclosure.

The rejection of claims 1-3, 10-12 and 22-27 as being anticipated by Johnson will not be sustained.

*Claims 4 and 13--Obviousness--Johnson in view of Douglas-Hamilton*

The Examiner relies on the Douglas-Hamilton patent as teaching the use of a gelatinized ice, and concludes that it would have been obvious to add a gel material to the phase change material of Johnson, because adding the gel would increase the thermal capacity of the mixture. (Ans. 6). The findings and conclusions related to this rejection do not account for the basic deficiency of the Johnson patent with respect to claims 1 and 10 in failing to



disclose a phase change temperature within the claimed range. In addition, we agree with Appellants (Appeal Br. 9) that the Examiner has not adequately established that persons of ordinary skill in the art would view increasing the thermal capacity of the mixture in the freeze indicator of Johnson as a desirable modification. As such, we view the Examiner's expressed reason to combine the teachings as lacking in rational underpinnings.

The rejection of claims 4 and 13 will not be sustained.

*Claims 5-8--Obviousness--Hjertstrand in view of Johnson*

Claims 6-8 are directed to a method that involves placing a phase change material close to or in close proximity to a biological material to maintain the temperature of the biological material at or near a phase change temperature of the phase change material. The phase change material is claimed as comprising a mixture of water and deuterium oxide that has a phase change temperature above zero degrees Celsius and below 3.8 degrees Celsius. (Appeal Br., Claims Appendix).

The Examiner cites to the Hjertstrand patent as disclosing a method for placing a phase change material near a biological material to control the temperature of the biological material. (Ans. 6). The Examiner acknowledges that Hjertstrand does not disclose using a phase change material that comprises a mixture of deuterium oxide and water. (*Id.*). The Examiner concluded that it would have been obvious to employ the phase change material of the Johnson patent, which does comprise a mixture of deuterium oxide and water, in the Hjertstrand container, "because deuterium oxide enables the container to maintain a temperature range of between -4 and 4 degrees Celsius, with the proper mixture determined through

experimentation” (Ans. 7).

The Examiner, in this conclusion, appears to be taking the separate teachings in Johnson that deuterium oxide has a freeze point around 4 degrees Celsius, and that a mixture of deuterium oxide with water can yield freeze points between -4° C. and 0° C., as a basis for stating that deuterium oxide enables the maintenance of a temperature range of between -4 and 4 degrees Celsius. However, even if deuterium oxide can perform as maintained by the Examiner, this is not evidenced in the Johnson patent. As noted above in the discussion of the anticipation rejection of claims 1 and 10, the explicit disclosure of Johnson does not appear to contemplate being able to maintain temperatures above zero degrees Celsius. Rather, Johnson states that a mixture of 98% deuterium oxide and 2% water will result in a freeze point of about zero degrees Celsius, and that other freeze points lower than zero degrees, namely between -4° C. and 0° C., may be produced by adding lesser amounts of deuterium oxide. (Johnson, col. 2, l. 65-col. 3, l. 2).

As such, the Examiner’s expressed reason to combine the teachings of Johnson with those of Hjertstrand is based upon an erroneous interpretation of the teachings of Johnson, and not on any rational underpinnings.

Moreover, the Hjertstrand patent, which is concerned with controlling the temperature of a biological material in the form of blood in a range of about 1° C. to about 6° C., appears to strongly favor the use of *homogenous* chemical substances, including deuterium oxide as one example, in that more clearly defined solidification/melting temperatures are obtained as a result of the substances being homogenous. (Hjertstrand, col. 5, ll. 11-17). While Johnson’s phase change materials are disclosed as aiding in fine-

tuning of the freezing point of the liquid for its freeze indicator, that Hjertstrand has itself provided a satisfactory solution for this problem is indicative that a person of ordinary skill in the art would not consider it to have been obvious to start modifying Hjertstrand's temperature control container with teachings directed to freeze indicators, absent some teaching that some improvement or benefit would be obtained in making the combination.

The rejection of claims 6-8 as being obvious, and therefore unpatentable, over Hjertstrand and Johnson will not be sustained.

Claim 5, which depends from claim 1, is also rejected over this combination of teachings. For the same reasons noted above, we believe that the combination relies on an erroneous interpretation of the Johnson patent, so the rejection will not be sustained as to claim 5, either.

*Claim 21--Obviousness--Johnson*

Appellants contend that the rejection of claim 21 as being obvious over Johnson is in error, in that the Examiner's finding (Ans. 8, last line of page) that Johnson discloses a biomaterial at column 2, lines 46-63, is not supported by the Johnson disclosure. We agree with Appellants that the cited portion of Johnson does not appear to disclose a biological material, within the meaning of that term as understood by a person of ordinary skill in the art.

The Examiner's position here is ambiguous, to say the least. While contending on the one hand that Johnson discloses the presence of a biomaterial, intimating that this is considered to meet the claim limitations in claim 21, the Examiner also states that "Johnson does not explicitly teach . . . limitation of 'positioning the phase change mater [sic] close to a biological

material”, and that “Johnson discloses the invention substantially as claimed . . . except the specific steps of method of positioning the phase change material close to a biological material such that a temperature of biological material is controlled by the phase change material.” (Ans. 8-9).

These statements are followed by some reasoning which appears to possibly be attempting to establish that since it is well known in the art to employ phase change materials such as dry ice to control the temperature of a biological material, it would have been obvious to employ the phase change material of Johnson for the same purpose. While Appellants do not expressly assign error to any part of the Examiner’s analysis, we find that we are unable to sustain the rejection.

The Examiner’s conclusion of obviousness is that, “it would have been obvious . . . to cool the mixture of deuterium oxide and water to a temperature range of zero to -3 degree C and position it close to a biological material such as blood in order to control the temperature of the biological material.” (Ans. 9). Setting aside that the Johnson device is not disclosed as being used to regulate the temperature of something, but only to indicate whether a particular temperature has been experienced, the Examiner’s conclusion fails to complete the establishment of a *prima facie* case of obviousness, in that it does not assert that it would have been obvious to mix deuterium oxide with water to form a phase change material having a phase change temperature in a range above zero degrees and below 3.8 degrees Celsius.

This rejection of claim 21 as unpatentable over Johnson will not be sustained.

*Claim 21--Obviousness--Hjertstrand in view of Johnson*

The Examiner concluded that it would have been obvious:

to combine the container of Hjertstrand et al. to replace thermo blocks 16 with the phase change material of Johnson to comprising with selected amount of deuterium oxide and water as taught by Johnson to maintain temperature of Hjertstrand's temperature sensitive material (biological material) in the disclosed range in order to control the a temperature of the biological material.

(Ans. 10-11).

This conclusion is based upon the same erroneous interpretation of the Johnson disclosure as was employed in the rejection of claims 6-8 over the same combination. In particular, the Examiner found that "Johnson teaches that by varying the amounts deuterium and water can get temperatures from -4 to 4 degree C." (Ans. 10). As discussed above with respect to claims 6-8, we do not find that Johnson contains such a teaching or disclosure.

For the reasons set forth above in the analysis of the rejection of claims 6-8, we will not sustain the rejection of claim 21 as unpatentable over Hjertstrand and Johnson.

### CONCLUSIONS

The Examiner's erroneous interpretation of the teachings of the Johnson patent has resulted in unsustainable rejections of claims 1-3, 10-12 and 22-27 as being anticipated by Johnson; of claims 4 and 13 as being unpatentable over Johnson in view of Douglas-Hamilton; of claims 5-8 as being unpatentable over Hjertstrand in view of Johnson; of claim 21 as being unpatentable over Johnson; and of claim 21 as being unpatentable over Hjertstrand in view of Johnson.

DECISION

The decision of the Examiner to reject claims 1-8, 10-13 and 21-27 is reversed.

REVERSED

JRG

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